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| APPLICATION NO.          | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--------------------------|-------------|----------------------|---------------------|------------------|
| 09/362,808               | 07/28/1999  | HONGYONG ZHANG       | 07977/088002        | 7320             |
| 20985                    | 7590        | 10/04/2004           | EXAMINER            |                  |
| FISH & RICHARDSON, PC    |             |                      |                     | RAO, SHRINIVAS H |
| 12390 EL CAMINO REAL     |             |                      |                     | ART UNIT         |
| SAN DIEGO, CA 92130-2081 |             |                      |                     | PAPER NUMBER     |
|                          |             |                      |                     | 2814             |

DATE MAILED: 10/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                               |  |
|------------------------------|------------------------|-------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b>           |  |
|                              | 09/362,808             | ZHANG, HONGYONG<br><i>Arv</i> |  |
| <b>Examiner</b>              | <b>Art Unit</b>        |                               |  |
| Steven H. Rao                | 2814                   |                               |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 08 November 2002.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) 1 to 13 is/are allowed.
- 6) Claim(s) 14-40 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. 08/753,428.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | Paper No(s)/Mail Date: _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date: _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|   | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Priority***

Receipt is acknowledged of paper submitted under 35 U.S.C. 114 claiming priority from U.S. Serial No. 09/362,808 filed on July 28, 1999 which itself claims priority under 119(a)-(d), from Japanese Patent Application No. 7-332629 filed on 11/27/1995 which papers have been placed of record in the file.

***Request for Continued Prosecution Examination (RCE)***

The request filed on 11/8/2002 for a Request for Continued Prosecution Application (RCE) under 37 CFR 1.114 based on parent Application No. 09/362,808 is acceptable and a RCE has been established. An action on the RCE follows.

***Information Disclosure Statement***

No further IDS have been filed after the one filed on February 14, 2000 in the instant Application.

***Preliminary Amendment Status***

Acknowledgment is made of entry of preliminary amendment filed 10/31 / 2002. Therefore claims 1, 6,10, 14, 16-19,21,24-26,28,39-40 as amended by the amendment and claims 2-5,7-9,11-13,15,20.22-23,27,29-39 as previously recited are currently pending in the Application.

***Allowable Subject Matter***

Claims 1,6, 10 ( independent) and claims 2-5,7-9,11-13 depending therefrom are allowed.

The following is an examiner's statement of reasons for allowance:

The prior art taken either singularly or in combination fails to anticipate or fairly suggest the limitation of the dependent claims, in such manner that a rejection under 35 U.S.C. 102 or 103 would be proper. The prior art fails to teach a combination of all the claimed features as presented in independent claims, which include A semiconductor device as recited in the independent claims generally and specifically " a third opening in said second interlayer insulating film for exposing said portion of said semiconductor layer, said portion of said gate insulating film and a portion of said first interlayer insulating film which surrounds the second opening.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to

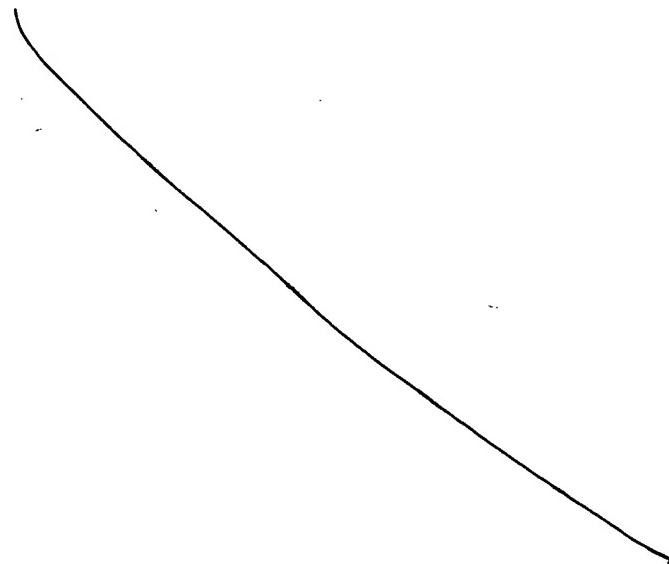
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a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made

Claims 14 -18 and 33-34 (newly added) are rejected under 35 U.S.C. 103(a) as being unpatentable over Fu et al. in view of Sasaki as applied to claims 1,3 and 5 above, and further in view of Lin et al. ( U.S patent # 5,8411,195)).

Fu et al. in view of Sasaki show most aspects of the instant invention ( in paragraph 2), including an gate electrode 30 formed over the insulating film and on a first interlayer insulating film and a second interlayer insulating film over said insulating film and the gate electrode at one contact hole in said first and second interlayer insulating film the first , second and third opening and connected with one of the source and drain regions through the first, second and third openings ( see figure 6). Fu et al. in view of Sasaki do not disclose a tapered angle B of the second interlayer insulating film 21 ( called O) with respect to a major surface the semiconductor layer 10 in the third opening is larger than a tapered angle of the first interlayer insulating film 20 ( called a) with respect to a major surface of the

semiconductor layer 10 in the third opening is larger than a tapered angle of the first interlayer insulating film 20 ( called a) with respect to a major surface of the



over

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semiconductor layer 10 in the second opening as recited in claim 6. However, Lin et al. show in figure 7 that the second buffer layer 22 being etched faster than the first buffer layer 20. Therefore, in view of Lin et al. shown in figure 7 ,where it is taught that the higher etching rate of an insulating film will produce an angle larger than the angle of another insulating film that has lower etching rate. These angles are the tilt angles of the cross-sectional shape of the contact holes with respect to a major surface below. The higher etching rate of an insulating film will produce an angle larger than the angle of another insulating film that has lower etching rate. These angles are the tilt angles of the cross-sectional shape of the contact holes with respect to a major surface below. As a result, referring to figure 6 of Fu et al., the second interlayer film 21 having high etching rate, will make a taper angle of the second interlayer film larger than the taper angle of the first interlayer 20 having lower etching rate. It is obvious to a person of ordinary skill in the art that etching protocol of Fu et al. will also produce taper angles as claimed in the instant invention.

Claims 19-30 and 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fu et al. in view of Sasaki and Lin et al. as applied to claims 2, 6-18 above, and further in view of Huang et al ( previous applied).

Fu et al. in view of Sasaki and Lin et al. show most the aspects of the instant invention ( paragraph 4 ). except for having a channel region, a low doped impurity region and high doped impurity region being adjacent to the channel region with the low doped impurity region interposed between. In figure 1, Huang teaches to use a semiconductor

In claims 22,23,29 and 30, the dosage of dope used is an intermediate process step and does not affect the final device structure.

In claims 22,23,29 and 30, the dosage of dope used is an intermediate process step and does not affect the final device structure.

Claims 38-40 recite the same limitation stated above namely, " the thickness of the first interlayer insulating film is less than one-third of the total thickness of the first and second interlayer insulating films." ( see Zhang's description stated above).

#### **Response to Arguments**

Applicant's arguments with respect to claims 1to 40 have been considered but are not persuasive for reasons setout under the rejections above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (703) 3065945. The examiner can normally be reached on 8.00 to 5.00.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information

*SL*  
*9/30/04*  
LONG PHAM  
PRIMARY EXAMINER